

EXHIBIT P

EXHIBIT 12

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U.S. Patent No. 10,135,682 (the “’682 Patent”) Exemplary Infringement Chart

Cox operates and maintains a nationwide television and data network through which it sells, leases, and offers for sale products and services, including the Technicolor CGM4981, Technicolor CGM4331, Technicolor CGM4141, Technicolor CVA4004, ARRIS / Surfboard TM3402, ARRIS / Surfboard G36, ARRIS / Surfboard G54, ARRIS / Surfboard S33, ARRIS / Surfboard CM8200, ARRIS / Surfboard G34, ARRIS / Surfboard SB8200, ARRIS / Surfboard DG2460, ARRIS TM9202, Hitron CODA56, Hitron CODA, Humax HGD310, Motorola B12, Motorola MB8611, Motorola MG8725, Motorola MB8600, Motorola MG8702, Netgear CM2000, Netgear C7800, Netgear CAX30, Netgear CAX80, Netgear CBR750, Netgear CM1000, Netgear CM1000v2, Netgear CM1100, Netgear CM1200, Netgear CM2500, Netgear CM3000, Ubiquiti UCI, ARRIS / Surfboard TG2472, ARRIS / Surfboard SBG7400AC2, ARRIS / Surfboard SBG7600AC2, Motorola MB7621, Motorola MG7700, Netgear C6900, Netgear C7000v2, Netgear C7500, Netgear CBR40, Netgear CM600, Netgear CM700, TP-LINK TC-7650, ARRIS / Surfboard SB6183, ARRIS / Surfboard SBG6900, Asus CM16, Motorola MB7420, Motorola MG7540, Motorola MG7550, Netgear C6230, Netgear C6250, Netgear C6300, Netgear C6300v2, Netgear CM500, TP-LINK TC-7620, TP-LINK CR500, TP-LINK CR700, TP-LINK CR1900, SMC D3CM1604, Zoom 5370, and products that operate in a similar manner (“Accused Cable Modem Products”), as well as the Arris AX013ANC STB, Arris AX013ANM STB, Pace PX022ANC STB, Pace PX022ANM STB, Samsung SX022ANC STB, Samsung SX022ANM STB, and products that operate in a similar manner (“Accused Set Top Products”). Cox provides cable television and internet services (“Accused Services”) via the lease, sale, and/or distribution of the Accused Cable Modem Products and/or the Accused Set Top Products. Cox literally and/or under the doctrine of equivalents infringes the claims of the ’682 Patent under 35 U.S.C. § 271(a) by making, using, selling, offering for sale, and/or importing the Accused Services, Accused Cable Modem Products, and/or the Accused Set Top Products.


As shown below in the chart with exemplary support, the Accused Services infringe at least claims 1-5 and 9 of U.S. Patent No. 10,135,682 (“’682 Patent”). The ’682 Patent was filed January 9, 2018, issued November 20, 2018, and is titled “Method and System for Service Group Management in a Cable Network.” The ’682 Patent claims priority to U.S. Patent Application Serial No. 15/434,673 filed on Feb. 16, 2017; U.S. Patent Application Serial No. 15/228,703 filed on Aug. 4, 2016; U.S. Patent Application Serial No. 13/948,444 filed on Jul. 23, 2013; and U.S. Provisional Patent Application No. 61/674,742 filed on Jul. 23, 2012.

The Accused Services are provided by utilizing, for example, a Cable Modem Termination System (“CMTS”) and/or Converged Cable Access Platform (“CCAP”) operated by Cox in communication with Cable Modem Products and/or Set Top Products located at each subscriber location. The Accused Services infringe the claims of the ’682 Patent, as described below, either directly under 35 U.S.C. § 271(a), or indirectly under 35 U.S.C. §§ 271(b)–(c).

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1pre	A method comprising:	<p>The Accused Services perform the claimed method utilizing, for example, including a Cable Modem Termination System (“CMTS”) and/or Converged Cable Access Platform (“CCAP”) operated by Cox in communication with at least one Cable Modem Product and/or Set Top Product located at each subscriber location.</p> <p>The Accused Services utilize CMTSs and/or CCAPs to send and receive packets to downstream cable modems over the Internet. By way of example, the Technicolor CGM4141 cable modem is charted herein. As described below, the Technicolor CGM4141 has a Broadcom BCM3390 SoC. On informed belief, all devices deployed by or enabled by Cox that contain the BCM3383, BCM3384, and BCM33843 series chips operate substantially the same as the BCM3390 series chips for purposes of the ’682 Patent. As there are no functional differences between the BCM33843 SoC and BCM3390 SoC that impacts infringement of the ’682 Patent, documents describing the operation of the BCM33843 SoC equally describe the operation of the BCM3390 SoC.</p> <p>Therefore, the Technicolor CGM4141 is representative of all Accused Set Top Products and Accused Cable Modem Products, including those having BCM3383, BCM3384, BCM33843, or BCM3390 SoCs.</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
1a	determining, by a cable modem termination system (CMTS), for each cable modem served by said CMTS, a corresponding	The CMTS and/or CCAP determine, for each cable modem served by said CMTS and/or CCAP, a corresponding signal-to-noise ratio (SNR) related metric as described below.

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	signal-to-noise ratio (SNR) related metric;	<p>The Accused Cable Modem Products, such as the Technicolor CGM4141, include chips capable of receiving and transmitting performance data to the CMTS and/or CCAP, such as Broadcom's BCM3390 system-on-a-chip ("SoC"), shown in the photograph below.</p>  <p>Accordingly, the Accused Set Top Products and Accused Cable Modem Products are capable of bidirectional communications with the CMTS and/or CCAP.</p>

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		<p>On informed belief, the Accused Services include a PMA system. <i>See, e.g.</i>, ENTROPIC_COX_002942 at ENTROPIC_COX_002943. The Accused Services use CMTSs and/or CCAPs to determine a corresponding signal-to-noise ratio (SNR) related metric for each cable modem served by said CMTS. On informed belief, the CMTS and/or CCAP utilizes a spectral analysis engine associated with an upstream receiver to gather detailed information about upstream channel noise and obtain information regarding downstream channel noise from the Accused Set Top Products and Accused Cable Modem Products. For example, the CMTS, via its PMA system, collects a variety of SNR-related metrics from both the Accused Set Top Products and Accused Cable Modem Products and the CMTS and/or CCAP, such as modulation error ratio (MER) and forward error correction (FEC) for upstream and/or downstream channels. On informed belief, MER and FEC are SNR-related metrics.</p> <p>“DOCSIS 3.1 specifications introduced features that leverage the OFDM-based PHY layer, including variable bit loading, and the ability to define multiple modulation profiles on downstream and upstream channels. Other new features include the ability to measure the quality of a downstream channel and test out the profiles in use, and features like upstream probes to measure the quality of the upstream OFDMA signal. The new MAC management messages support this on a per CM basis. There are also extensive additions to important operational items within proactive network maintenance (PNM) which enables measurement of various physical layer metrics and exposes that data to the operators.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001932)</p> <p>“There are a couple of different ways the CMTS can check how the CM is performing on the Downstream. The OPT-REQ MAC Management message is used by the CMTS to cause a CM to test various aspects of an OFDM downstream channel. A single OPT-REQ message can be used to test the CM’s ability to receive the specified downstream OFDM profile by checking for FEC statistics, alternatively it can be used to query the CM’s RxMER statistics. CMTSs today follow one or both of the above approaches, they periodically check for RxMER of the CM or the FEC</p>

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		<p>statistics for a particular profile. A CMTS does this periodically by issuing OPT-REQ messages to every CM on the OFDM channel. The rate at which the CMTS does this can be configured in a vendor proprietary manner. The CMTS compares the numbers from these measurements with a certain threshold, before it decides it needs to downgrade or upgrade the profile on which the traffic reaches the CM.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001948-9)</p> <p>“A CMTS uses upstream probes for ranging-related functions such as determining transmit pre-equalizer coefficients and additionally using an upstream probe to take an RxMER measurement. To do this, the CMTS grants P-IEs in a P-MAP message with the "MER" bit set. When the CMTS receives the probe transmission corresponding to such a grant, it performs the RxMER measurement. Some types of upstream profile performance measurements cannot be performed using probe bursts, like FEC performance or count CRC errors for a particular profile. Probe bursts cannot be used for these purposes since they carry no information. D3.1 systems support sending/receiving upstream Data Profile Testing bursts. The CMTS first assigns a Data Profile Testing SID to the modem on one or more upstream channels. (Transmit channel set encodings can be sent as part of a DBC transaction.) The CMTS then sends a grant to a Data Profile Testing SID. The CM responds to this grant by sending a Data Profile Testing burst in the grant.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001964)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
1b	assigning, by said CMTS, each cable modem among a plurality of service groups based on a	A service group includes one or more cable modems. The CMTS and/or CCAP assigns each cable modem among a plurality of service groups based on a respective corresponding SNR-related metric as described below.

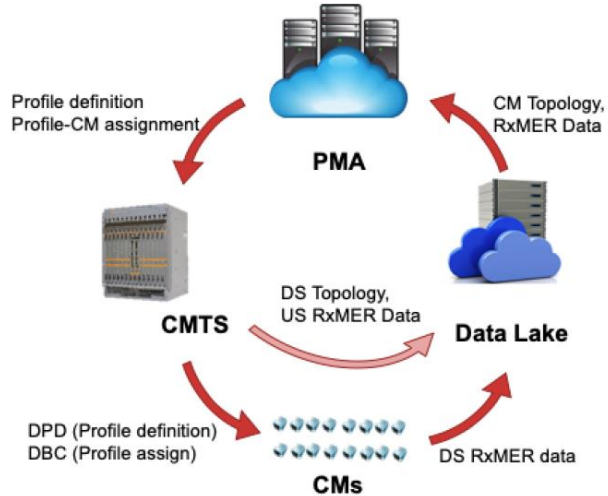
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	respective corresponding SNR-related metric;	<p>Specifically, the CMTS and/or CCAP profiles cable modems to determine characteristics of the communication channel between the CMTS and/or CCAP and the downstream Accused Set Top Products and Accused Cable Modem Products. On informed belief, the CMTS and/or CCAP allows a fixed number of modulation profiles to be defined. The CMTS and/or CCAP organize the downstream Accused Set Top Products and Accused Cable Modem Products into groups based on the SNR-related metric. On informed belief, this grouping is performed independently for the upstream channels and the downstream channels. All the cable modems in a particular group use a modulation profile assigned to the group.</p> <p>“PMA Goal: The goal of designing profiles is to increase reliable operation and throughput per CM. PMA essentially consists of intelligent clustering algorithms to group CMs which share similar noise characteristics together: Groups of CMs get assigned a unique custom designed profile, which works around specific ingress issues etc. The tasks an external PMA performs for both downstream and upstream profiles are as follows: 1. Create a set of optimized modulation profiles for use on an OFDM or OFDMA channel by selecting the best modulation order for each subcarrier based on the channel quality measured at the CMs/CMTS using the channel profile test or probes. (For all CMs) 2. For a new CM joining the network and periodically for all active CMs, find the best fit among existing modulation profiles and recommend modulation profile usage. (Per CM) 3. Create backup profiles or downgrade a CM based on errors on a certain profile. E.g. based on CM performance and SNR margin, provide a better modulation profile for a CM. (Per CM)” (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>

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1c	<p>generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups;</p>	<p>The CMTS and/or CCAP generate, for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups as described below.</p> <p>Specifically, the CMTS and/or CCAP generate SNR-related metrics based on a worst-case SNR profile of each service group. On informed belief, the CMTS and/or CCAP intelligently cluster devices sharing similar noise characteristics and assigns a profile to each group that works around specific ingress issues, etc. in the downstream and/or upstream channel based on the channel quality measured at the CMs/CMTS, which constitutes generating, by said CMTS for each one of said plurality of service groups, a composite SNR-related metric based at least in part on a worst-case SNR profile of said SNR-related metrics corresponding to said one of said plurality of service groups as claimed. For example, the CMTS and/or CCAP selects a modulation profile based on worst-case noise that is expected on the upstream channel and still achieve a reasonable level of performance for the devices in each of the service groups. For example, the CMTS and/or CCAP selects a modulation profile based on worst-case noise that is expected on the downstream channel and still achieve a reasonable level of performance for the devices in each of the service groups.</p> <p>“PMA Goal: The goal of designing profiles is to increase reliable operation and throughput per CM. PMA essentially consists of intelligent clustering algorithms to group CMs which share similar noise characteristics together: Groups of CMs get assigned a unique custom designed profile, which works around specific ingress issues etc. The tasks an external PMA performs for both downstream and upstream profiles are as follows: 1. Create a set of optimized modulation profiles for use on an OFDM or OFDMA channel by selecting the best modulation order for each subcarrier based on the channel quality measured at the CMs/CMTS using the channel profile test or probes. (For all CMs) 2. For a new CM joining the network and periodically for all active CMs, find the best fit among existing modulation profiles and recommend modulation profile usage. (Per CM) 3. Create backup profiles or downgrade a CM based on errors on a certain profile. E.g. based on CM performance and SNR margin, provide a better modulation profile for a CM. (Per CM)”</p>

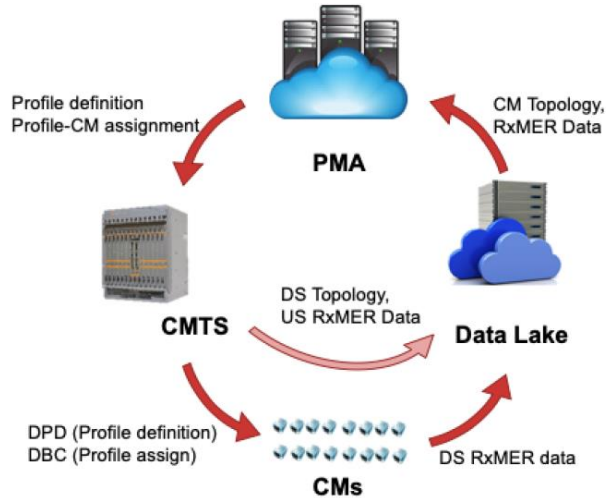
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		<p>(ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p>  <p>Figure 24 – Profile Management Application Deployment Architecture (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
1d	<p>selecting, by said CMTS, one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said</p>	<p>The CMTS and/or CCAP select one or more physical layer communication parameter to be used for communicating with said one of said plurality of service groups based on said composite SNR-related metric as described below.</p> <p>Specifically, the CMTS and/or CCAP select one or more physical layer communication parameters to be used for communicating, via a physical layer, with each service group of downstream</p>

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	composite SNR-related metric; and	<p>modems. For example, the CMTS and/or CCAP select one or more physical communication parameters that control Accused Set Top Products and Accused Cable Modem Products in the various upstream channels and downstream channels, which have been configured via the modulation profiles. For example, when adding additional forward error correction to attempt to correct for errors is no longer efficient, a lower modulation rate (e.g. a physical layer communication parameter) can be applied to a particular service group. On informed belief, this adjustment of modulation rate is independently determined for upstream channels and downstream channels.</p> <p>“PMA Goal: The goal of designing profiles is to increase reliable operation and throughput per CM. PMA essentially consists of intelligent clustering algorithms to group CMs which share similar noise characteristics together: Groups of CMs get assigned a unique custom designed profile, which works around specific ingress issues etc. The tasks an external PMA performs for both downstream and upstream profiles are as follows: 1. Create a set of optimized modulation profiles for use on an OFDM or OFDMA channel by selecting the best modulation order for each subcarrier based on the channel quality measured at the CMs/CMTS using the channel profile test or probes. (For all CMs) 2. For a new CM joining the network and periodically for all active CMs, find the best fit among existing modulation profiles and recommend modulation profile usage. (Per CM) 3. Create backup profiles or downgrade a CM based on errors on a certain profile. E.g. based on CM performance and SNR margin, provide a better modulation profile for a CM. (Per CM)” (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>“Since CMs can be assigned to modulation profiles that are optimized for their channel conditions, there is no longer a fixed value for channel capacity. The cleaner the channel is to any CM, the higher the modulation order its traffic is carried on, raising the overall average efficiency, and hence the overall capacity of the channel. Capitalizing on this capability requires that the PMA can determine the channel conditions to the set of CMs in the Service Group, and that from this</p>

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		<p>information determine the optimal set of (up to 16) modulation profiles. CMTSs today support ~4 DS profiles, with plans to increase the number of profiles supported.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001954)</p>  <p>Figure 24 – Profile Management Application Deployment Architecture (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
1e	communicating, by said CMTS, with one or more cable modems corresponding to said one of said	The CMTS and/or CCAP communicate with one or more cable modems corresponding to said one of the plurality of service groups using the selected one or more physical layer communication parameter as described below.

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	<p>plurality of service groups using said selected one or more physical layer communication parameter.</p>	<p>Specifically, the Accused Services communicate, via CMTSs and/or CCAPs, messages that include parameters that control the Accused Set Top Products and Accused Cable Modem Products in each of said plurality of service groups in the applicable upstream and downstream channels. These communications utilize the selected one or more physical layer communication parameters.</p> <p>“PMA Goal: The goal of designing profiles is to increase reliable operation and throughput per CM. PMA essentially consists of intelligent clustering algorithms to group CMs which share similar noise characteristics together: Groups of CMs get assigned a unique custom designed profile, which works around specific ingress issues etc. The tasks an external PMA performs for both downstream and upstream profiles are as follows: 1. Create a set of optimized modulation profiles for use on an OFDM or OFDMA channel by selecting the best modulation order for each subcarrier based on the channel quality measured at the CMs/CMTS using the channel profile test or probes. (For all CMs) 2. For a new CM joining the network and periodically for all active CMs, find the best fit among existing modulation profiles and recommend modulation profile usage. (Per CM) 3. Create backup profiles or downgrade a CM based on errors on a certain profile. E.g. based on CM performance and SNR margin, provide a better modulation profile for a CM. (Per CM)” (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>“Since CMs can be assigned to modulation profiles that are optimized for their channel conditions, there is no longer a fixed value for channel capacity. The cleaner the channel is to any CM, the higher the modulation order its traffic is carried on, raising the overall average efficiency, and hence the overall capacity of the channel. Capitalizing on this capability requires that the PMA can determine the channel conditions to the set of CMs in the Service Group, and that from this information determine the optimal set of (up to 16) modulation profiles. CMTSs today support ~4 DS profiles, with plans to increase the number of profiles supported.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001954)</p>

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2	2. The method of claim 1, wherein said one or more physical layer communication parameter includes one or more of: transmit power, receive sensitivity, timeslot duration, modulation type, modulation order, forward error correction (FEC) type, and FEC code rate.	<p>Said one or more physical layer communication parameter includes one or more of: transmit power, receive sensitivity, timeslot duration, modulation type, modulation order, forward error correction (FEC) type, and FEC code rate as described below.</p> <p>More specifically and on informed belief, a modulation profile includes at least a modulation type and a modulation order.</p> <p>“A modulation profile consists of a vector of bit-loading values, an integer value for each active subcarrier in the downstream channel. The modulation orders range from 16-QAM to 16384-QAM, the range of bit-loading values is from 4 to 14 (skipping 5); however, it is expected that very low bit-loading values, 7 or less, will be used very infrequently since most plants support 256 QAM today, but those will likely be in use in the roll-off regions. Each CM will support and can be assigned up to four modulation profiles, including Profile A (used for broadcast frames), an optimized profile for the CM’s unicast traffic, and possibly two additional profiles that could be used for multicast traffic.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001933)</p> <p>“A modulation profile is a list of modulation orders or bit loading configurations, defined for each subcarrier within an OFDM channel, or for each minislot in an OFDMA channel. A CMTS can define multiple modulation profiles/IUCs for use on a channel, where the profiles differ in the modulation orders assigned to each subcarrier or minislot. A CMTS can assign different downstream and upstream modulation profiles for different groups of CMs.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p>

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3	3. The method of claim 1, wherein said CMTS uses orthogonal frequency division multiplexing (OFDM) over a plurality of subcarriers for said communicating.	<p>Said CMTS uses orthogonal frequency division multiplexing (OFDM) over a plurality of subcarriers for said communicating as described below.</p> <p>Specifically, Cox provides a variety of DOCSIS 3.1 cable modems including the Technicolor CGM4981, Technicolor CGM4331, Technicolor CGM4141, Technicolor CVA4004, ARRIS / Surfboard TM3402, ARRIS / Surfboard G36, ARRIS / Surfboard G54, ARRIS / Surfboard S33, ARRIS / Surfboard CM8200, ARRIS / Surfboard G34, ARRIS / Surfboard SB8200, ARRIS / Surfboard DG2460, ARRIS TM9202, Hitron CODA56, Hitron CODA, Humax HGD310, Motorola B12, Motorola MB8611, Motorola MG8725, Motorola MB8600, Motorola MG8702, Netgear CM2000, Netgear C7800, Netgear CAX30, Netgear CAX80, Netgear CBR750, Netgear CM1000, Netgear CM1000v2, Netgear CM1100, Netgear CM1200, Netgear CM2500, Netgear CM3000, Ubiquiti UCI, and products that operate in a similar manner (“Accused D3.1 Cable Modem Products”). The CMTS and/or CCAP use OFDM to communicate with at least the Accused D3.1 Cable Modem Products via downstream channels. On informed belief, the CMTS and/or CCAP use OFDMA to communicate with at least the Accused D3.1 Cable Modem Products via upstream channels. Both OFDM and OFDMA utilize a plurality of subcarriers for communications between the CMTS and/or CCAP and at least the Accused Cable Modem Products.</p> <p>“DOCSIS 3.1 specifications introduced features that leverage the OFDM-based PHY layer, including variable bit loading, and the ability to define multiple modulation profiles on downstream and upstream channels. Other new features include the ability to measure the quality of a downstream channel and test out the profiles in use, and features like upstream probes to measure</p>

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		<p>the quality of the upstream OFDMA signal. The new MAC management messages support this on a per CM basis. There are also extensive additions to important operational items within proactive network maintenance (PNM) which enables measurement of various physical layer metrics and exposes that data to the operators.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001932)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
4	<p>4. The method of claim 3, comprising selecting, by said CMTS, said one or more physical layer communication parameter on a per-OFDM-subcarrier basis.</p>	<p>The CMTS and/or CCAP select said one or more physical layer communication parameter on a per-OFDM-subcarrier basis as described below.</p> <p>Specifically, the CMTS and/or CCAP are operable to at least determine modulation profiles (e.g. physical layer communication parameters) on a per-subcarrier basis.</p> <p>“To leverage the new OFDM/A physical layer to its maximum benefit, different subcarriers use different modulation orders. Optimizing the downstream/upstream profiles allows a downstream/upstream channel to be able to operate with lower Signal-to-Noise Ratio (SNR) margin, potentially allowing a channel to operate at an overall higher throughput. The logic to achieve this can be external to a CCAP and enable innovation. For a cable operator, it allows uniform operation of such algorithms across different CCAP platforms.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001933)</p> <p>“A modulation profile is a list of modulation orders or bit loading configurations, defined for each subcarrier within an OFDM channel, or for each minislot in an OFDMA channel. A CMTS can define multiple modulation profiles/IUCs for use on a channel, where the profiles differ in the</p>

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		<p>modulation orders assigned to each subcarrier or minislot. A CMTS can assign different downstream and upstream modulation profiles for different groups of CMs.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>“PMA Goal: The goal of designing profiles is to increase reliable operation and throughput per CM. PMA essentially consists of intelligent clustering algorithms to group CMs which share similar noise characteristics together: Groups of CMs get assigned a unique custom designed profile, which works around specific ingress issues etc. The tasks an external PMA performs for both downstream and upstream profiles are as follows: 1. Create a set of optimized modulation profiles for use on an OFDM or OFDMA channel by selecting the best modulation order for each subcarrier based on the channel quality measured at the CMs/CMTS using the channel profile test or probes. (For all CMs) 2. For a new CM joining the network and periodically for all active CMs, find the best fit among existing modulation profiles and recommend modulation profile usage. (Per CM) 3. Create backup profiles or downgrade a CM based on errors on a certain profile. E.g. based on CM performance and SNR margin, provide a better modulation profile for a CM. (Per CM)” (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
5	5. The method of claim 4, wherein said one or more physical layer communication parameter includes one or both of: which of said OFDM subcarriers to use for transmission to said	<p>Said one or more physical layer communication parameter includes one or both of: which of said OFDM subcarriers to use for transmission to said CMTS, and which of said OFDM subcarriers to use for reception of information from said CMTS as described below.</p> <p>Specifically and on informed belief, a CMTS and/or CCAP can utilize OFDM subcarriers to communicate with at least the Accused Cable Modem Products over downstream channels (e.g. receipt</p>

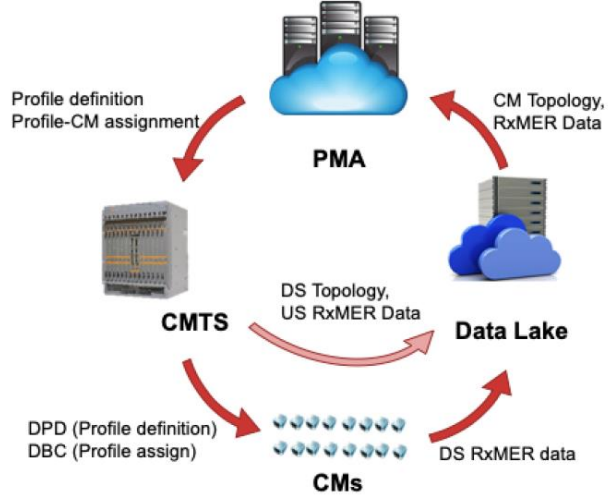
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	CMTS, and which of said OFDM subcarriers to use for reception of information from said CMTS.	<p>from the CMTS and/or CCAP), and OFDM subcarriers in an OFDMA mini-slot to communicate with at least the Accused Cable Modem Products over upstream channels (e.g. transmissions to the CMTS and/or CCAP).</p> <p>“A modulation profile is a list of modulation orders or bit loading configurations, defined for each subcarrier within an OFDM channel, or for each minislot in an OFDMA channel. A CMTS can define multiple modulation profiles/IUCs for use on a channel, where the profiles differ in the modulation orders assigned to each subcarrier or minislot. A CMTS can assign different downstream and upstream modulation profiles for different groups of CMs.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001953)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
9pre	9. The method of claim 1, wherein said determining said plurality of SNR-related metrics comprises:	See 1pre-1a.
9a	transmitting a probe message to each cable modem, said probe message comprising instructions for measuring a metric and reporting said measured metric back to said CMTS; and	<p>Determining said plurality of SNR-related metrics includes transmitting a probe message to each cable modem, said probe message comprising instructions for measuring a metric and reporting said measured metric back to said CMTS as described below.</p> <p>More specifically, the CMTS and/or CCAP transmit a request for data, such as MER data, to each Accused Cable Modem Products and/or Accused Set Top Products. On informed belief, the request includes instructions to report the measured metrics back to the CMTS and/or CCAP.</p>

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		<p>“There are a couple of different ways the CMTS can check how the CM is performing on the Downstream. The OPT-REQ MAC Management message is used by the CMTS to cause a CM to test various aspects of an OFDM downstream channel. A single OPT-REQ message can be used to test the CM’s ability to receive the specified downstream OFDM profile by checking for FEC statistics, alternatively it can be used to query the CM’s RxMER statistics. CMTSs today follow one or both of the above approaches, they periodically check for RxMER of the CM or the FEC statistics for a particular profile. A CMTS does this periodically by issuing OPT-REQ messages to every CM on the OFDM channel. The rate at which the CMTS does this can be configured in a vendor proprietary manner. The CMTS compares the numbers from these measurements with a certain threshold, before it decides it needs to downgrade or upgrade the profile on which the traffic reaches the CM.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001948-9)</p> <p>“Data Polling Manager periodically triggers DCCF to start a new round of OFDM DS RxMER data polling, and also triggers OFDM channel-based topology discovery on the CMTS. It could be an MSO specific implementation with an ability to pre-process the raw data from the data collector (DCCF in the system).” (ENTROPIC_COX_001928 at ENTROPIC_COX_001955)</p> <p>“The recommended functions of a Data Polling Manager are: PNM RxMER test triggering functions, including periodic triggering scheduler functions; Manage DCCF API calls and translate DS RxMER data to a PMA understandable format; Understand and translate returned OFDM channel-based topology from DCCF; Perform highly efficient Data Store API calls for storing pre-processed data in place.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001955)</p>

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		 <p>Figure 24 – Profile Management Application Deployment Architecture (ENTROPIC_COX_001928 at ENTROPIC_COX_001954)</p> <p>Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.</p>
9b	receiving a metric reporting message from each cable modem.	<p>Determining said plurality of SNR-related metrics includes receiving a metric reporting message from each cable modem as described below.</p> <p>More specifically, the CMTS and/or CCAP receive the metric reporting message from each of the Accused Cable Modem Products and/or Accused Set Top Products.</p>

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		<p>“Data Store is where the PMA gets the RxMER data and MAC addresses of CMs that are on each OFDM channel. It consists of two parts, a Data Lake and a thin service layer that serves data with restful APIs.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001955)</p> <p>“The recommended functions of a Data Polling Manager are: PNM RxMER test triggering functions, including periodic triggering scheduler functions; Manage DCCF API calls and translate DS RxMER data to a PMA understandable format; Understand and translate returned OFDM channel-based topology from DCCF; Perform highly efficient Data Store API calls for storing pre-processed data in place. The recommended functions of a Data Store are: The restful API service of the Data Store must comply the APIs defined by the PMA and must serve the data in formats that PMA can understand; The Data Lake of the Data Store could be a database or an HDFS, per actual needs.” (ENTROPIC_COX_001928 at ENTROPIC_COX_001955)</p> <div data-bbox="961 834 1562 1333"> <pre> graph TD PMA[PMA] -- "Profile definition Profile-CM assignment" --> CMTS[CMTS] CMTS -- "DPD (Profile definition) DBC (Profile assign)" --> CMs[CMs] CMs -- "DS RxMER data" --> DataLake[Data Lake] DataLake -- "DS Topology, US RxMER Data" --> PMA PMA -- "CM Topology, RxMER Data" --> DataLake </pre> <p>The diagram illustrates the Profile Management Application Deployment Architecture. It shows four main components: PMA (Profile Management Agent), CMTS (Cable Modem Termination System), Data Lake, and CMs (Cable Modems). The PMA is at the top, connected to the CMTS on the left and the Data Lake on the right. The CMTS is connected to the CMs at the bottom. The Data Lake is connected to the PMA and the CMs. The flow of data and control is as follows: PMA sends 'Profile definition' and 'Profile-CM assignment' to CMTS. CMTS sends 'DPD (Profile definition)' and 'DBC (Profile assign)' to CMs. CMs send 'DS RxMER data' to the Data Lake. The Data Lake sends 'DS Topology, US RxMER Data' back to the PMA. Additionally, the PMA sends 'CM Topology, RxMER Data' to the Data Lake.</p> </div> <p>Figure 24 – Profile Management Application Deployment Architecture</p>

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		(ENTROPIC_COX_001928 at ENTROPIC_COX_001954) Discovery will provide detailed information regarding implementation and identification of the specific components, source code, software and/or other instrumentalities used to implement the claimed system. As additional information is obtained through discovery related to the Accused Services and related instrumentalities, Entropic will supplement these contentions.